THE BAIT SHRIMP INDUSTRY OF THE GULF OF MEXICO

by

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INTRODUCTION

Live shrimp is the preferred bait for sea trouts, redfish, flounders and most game fishes of the bays and inshore waters of the Gulf of Mexico. The use of shrimp for this purpose has given rise to a large bait industry in some areas. Approximately 39 million shrimp with a retail value of $500,000 were utilized by the bait industry in northeast Florida during a 12-month period in 1952-53. The bait catch on the west coast of Florida in 1955 amounted to almost 59 million shrimp with a retail value of nearly $2,000,000. In Galveston Bay, Texas, over 252,000 pounds of shrimp retailed at almost $292,000 from June 1957 through May 1958. It is apparent that catching shrimp for bait is an important industry in the Gulf States. We shall describe the fishing gear used by bait fishermen, the methods of operation, and the marketing practices in Texas and Florida. In other areas of the Gulf, marketing practices may differ considerably, but fishing gear and methods of operation are similar.

KINDS OF SHRIMP IN THE BAIT FISHERY

The bait fishery is based on three kinds of shrimp, also used as food: the white shrimp, the brown shrimp, and the pink shrimp. The kind that predominates varies according to locality and time of year.

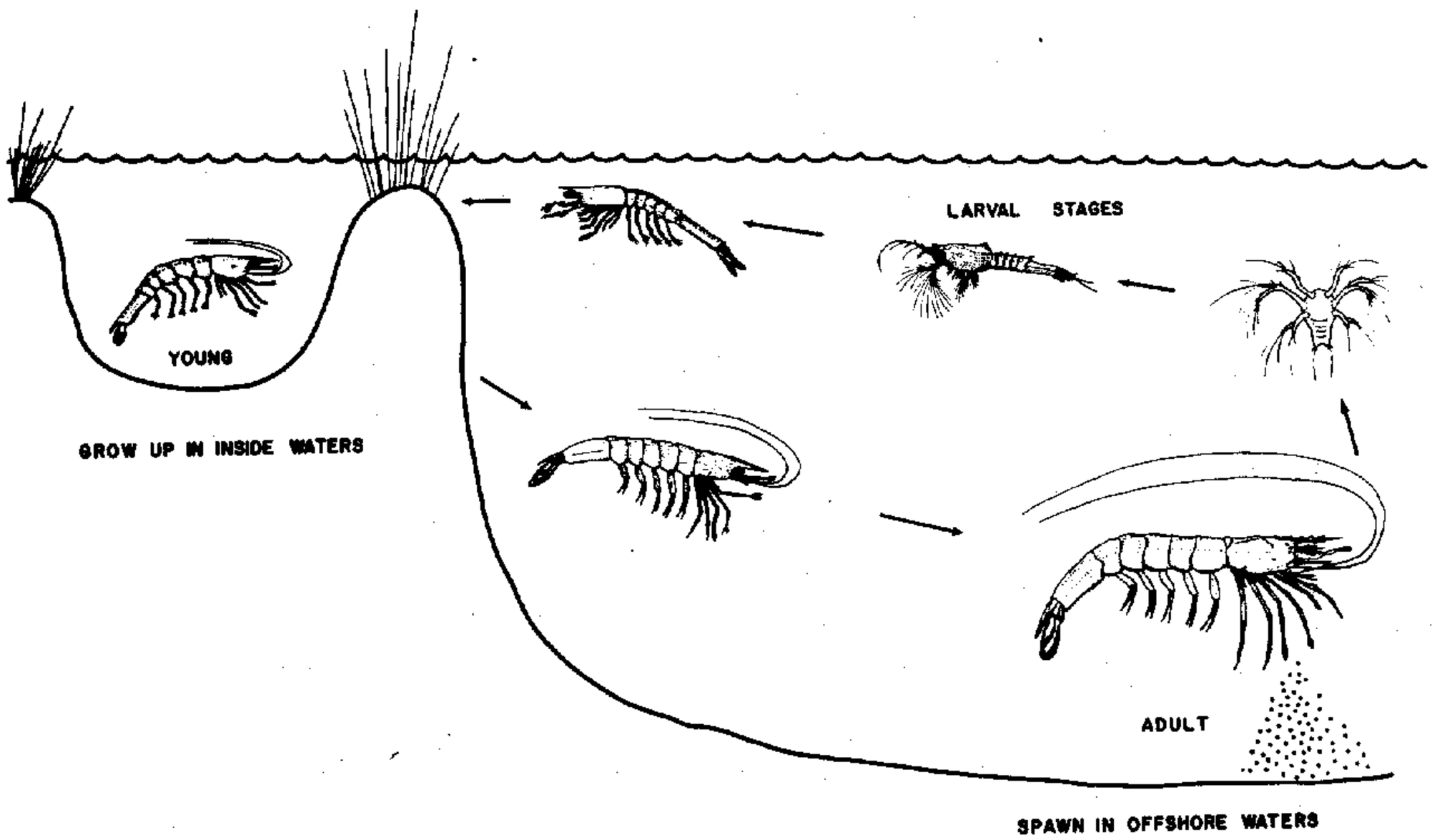
On the northeast coast of Florida, the bait fishery north of New Smyrna is dependent on white shrimp, and that from New Smyrna to Fort Pierce is based on brown and pink shrimp. On the west coast of Florida from Cedar Key to Naples, the catch is chiefly pink shrimp.

In Galveston Bay on the Texas coast, brown shrimp dominate the bait catch from May through the middle of July, white shrimp from August through April. Pink shrimp occur infrequently.

Other shrimp that occasionally enter the bait fishery include the sea bob and the broken-neck shrimp. In some areas, after periods of heavy rainfall, freshwater river shrimp enter the bays and are utilized by the bait fishery. Several species of grass shrimp are numerous along the marshes of inshore waters and are commonly mistaken for the young of commercial varieties of shrimp. Although grass shrimp are very hardy, they seldom exceed 2 inches in total length, and are not used to any extent by the bait fishery. The eggs of grass and river shrimps are carried under the abdomen by the female, while the eggs of the common commercial shrimps are shed into the water.

GENERAL LIFE HISTORY OF THE WHITE SHRIMP

Spawning takes place in the open waters of the Gulf from March to September. In mating, the male attaches a sperm sac to the female. Later, this sperm sac is ruptured by the female to fertilize the eggs as they are shed into the water. From 500,000 to 1,000,000 eggs are shed during a single spawning. The eggs measure about a hundredth of an inch in diameter; they sink to the bottom and hatch approximately 24 hours after being spawned. The larvae are free floating for about 3 weeks, during which time they move from the offshore waters of the spawning grounds into the bays, estuaries, and marshes. The shrimp then adopt a bottom-dwelling existence, apparently for the first time. Four to ten weeks of rapid growth are spent in the inside waters.



As the shrimp mature and increase in size, they gradually move back to the open waters, presumably to the offshore spawning grounds. Less is known about the brown and pink shrimp, but the general life history is assumed to follow the same pattern.

Fishing gear and methods of operation

Bait shrimp are caught with try nets, small otter trawls commonly used by the large vessels of the commercial fishery for locating schools of shrimp before fishing the main net. Small cast nets and minnow seines are used by sport fishermen to obtain shrimp for personal use, but are not used by bait fishermen. Try nets are generally made with No. 12 or 15 cotton twine and measure about 10 feet along the cork line and about 25 feet in total length. Mesh sizes vary from 1 1/4 to 1 3/8 inch stretched measure. The doors used for spreading the nets range in length from 18 to 60 inches, and in width from 12 to 24 inches. There are considerable differences in the sizes of nets and doors depending on County regulations. The nets are towed from skiffs, equipped with 10 to 25 horsepower outboard motors, or small trawlers, 18 to 25 feet in length.

Current State regulations prohibit commercial, but not bait shrimp fishing in inside waters from July 15 to August 31 and from December 15 to March 1 [1/]. When the bays are opened to commercial fishing, larger nets are permitted and some bait fishermen shift to nets which measure 40 feet along the cork line. Although bait shrimping is carried on throughout the year, most of the production occurs from May through October. When shrimp are abundant, each boat makes 10 to 20 hauls each day depending on the demand. To prevent excessive death of shrimp, fishing is generally confined to the hours just before dawn, and is concentrated as near to the major retail outlet as possible. As a result, the bait shrimp fishery is chiefly a bay fishery.

The catch is unloaded into a bait well on the boat and sorted. Non-salable fish and trash are discarded immediately. Large blue crabs are saved for later sale either as food or as bait for redfish. Dead shrimp are saved for the dead bait market, or if sufficiently large and numerous, are sold as food. Live shrimp are brought to the retail outlet in barges or modified skiffs towed behind or alongside the boat. The barges and skiffs are partitioned into a number of compartments. The compartments fore and aft are air-tight to keep the barge afloat. The middle compartments, in which the shrimp are held, are perforated on the bottom and sides to permit water flow.

Transporting and holding methods

When shrimp are scarce, some dealers haul shrimp from distant areas in tank trucks, usually modified pick-up or dump trucks. Tanks are made

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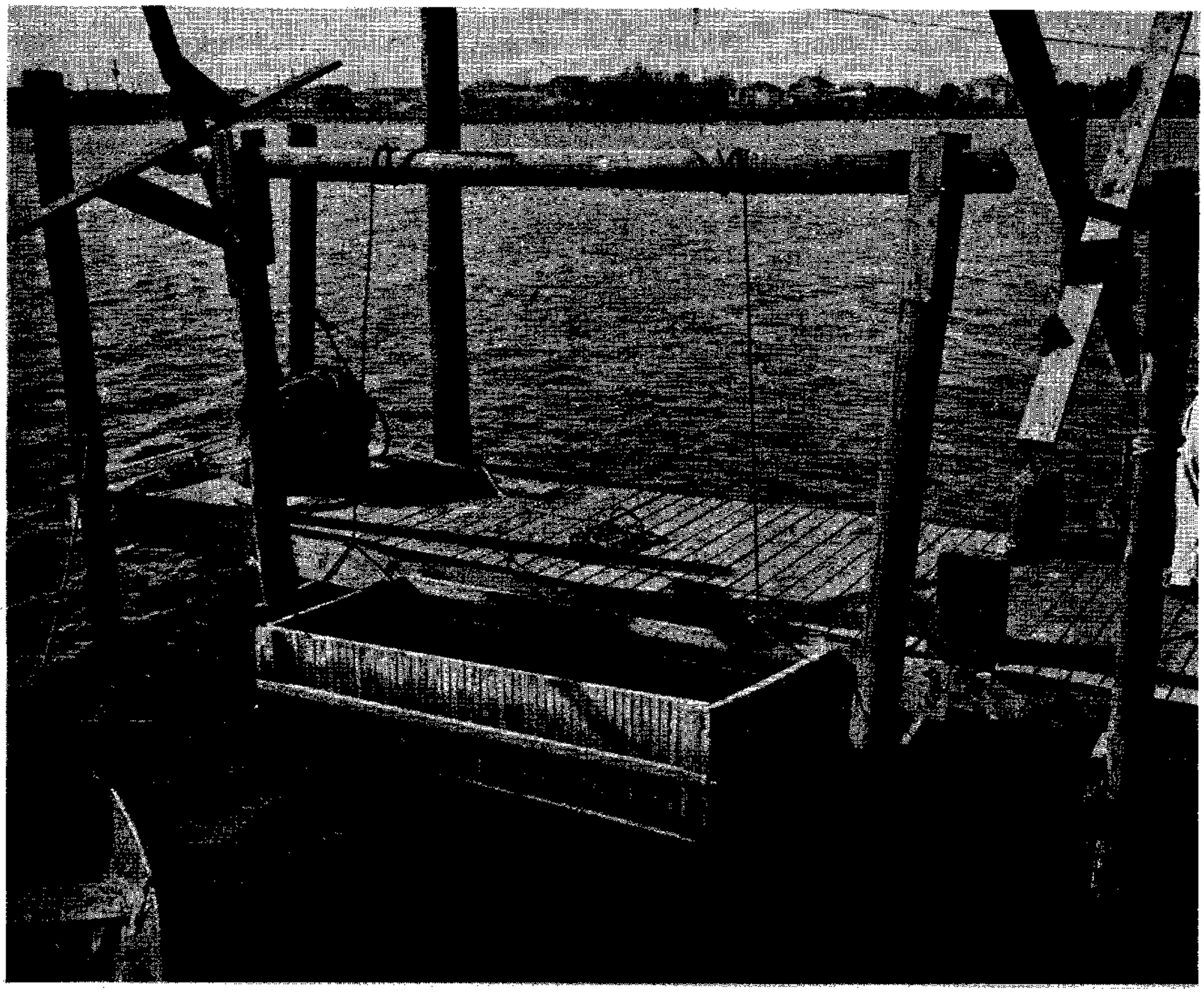
1/ In spite of the commercial aspects involved, the bait shrimp fishery is considered apart from the commercial fishery which obtains shrimp for use as food.

of plywood and divided into several compartments, each provided with a screened top to prevent shrimp from escaping. The carrying capacity of each tank is considered by dealers not to exceed 200 quarts of shrimp. Aeration is provided by continually recirculating the water by a gasoline-powered brass pump. A few dealers aerate the water by bubbling oxygen through air stones from oxygen cylinders, but this method is not widely used because the expenses incurred are substantially increased without significant increase in survival.

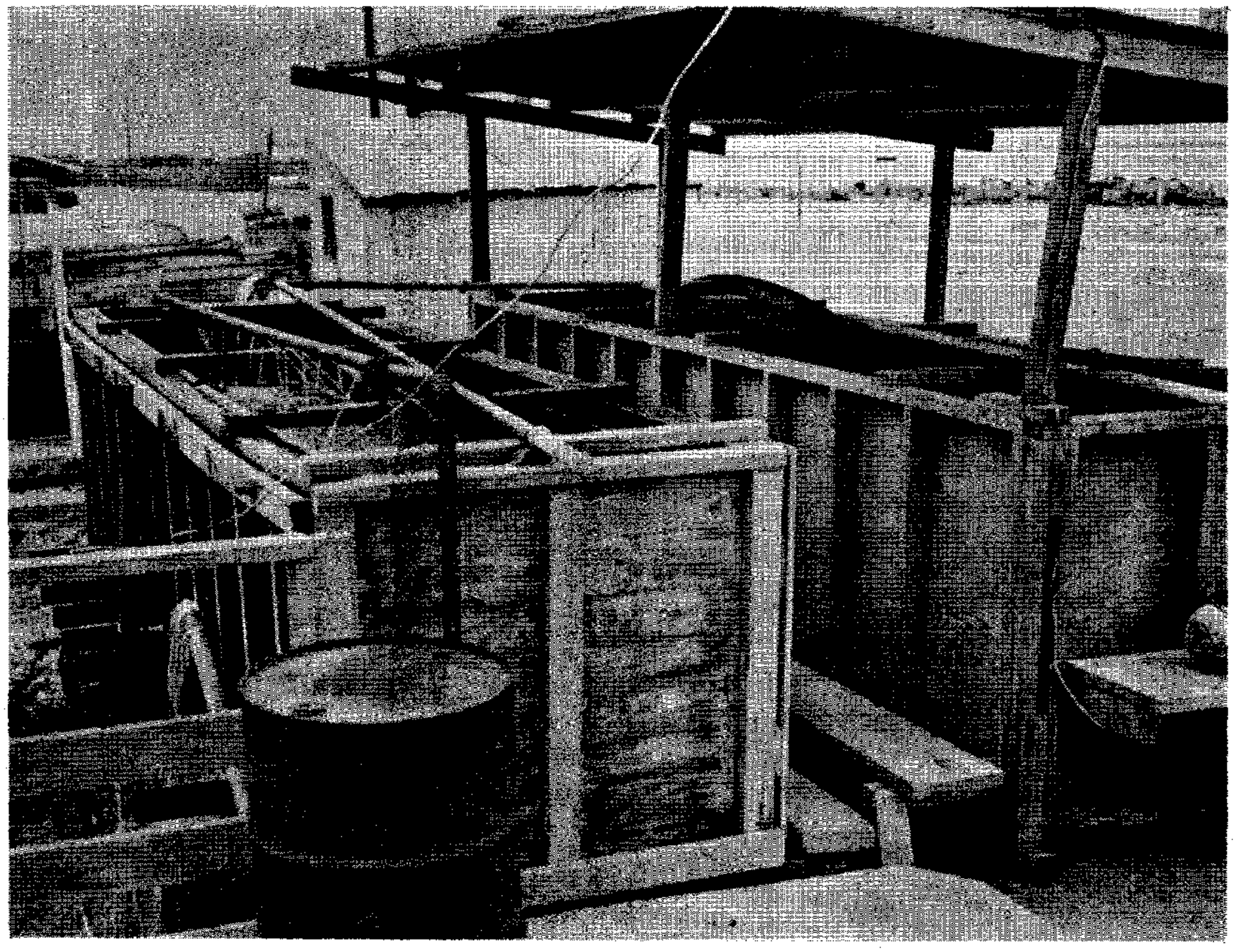
Two types of holding pens are very common. One type is made from cypress slats or perforated fiberboard and is suspended in the water. Water exchange is by means of natural currents and tidal movements. The pens can be raised by a simple but effective winch arrangement. The other type is a watertight tank set on the ground and made of concrete, fiber-



board, plywood, or planks. Water is pumped into the tank continuously for aeration and waste products are removed by the overflow. Most tanks of this type are shaded to keep the water cool and to prevent excessive plant growth. Both types are generally 4 by 4 by 8 feet. Pens of this size have a capacity of 25 to 30 quarts of live shrimp. Each dealer has two or three tanks; a few have as many as six.

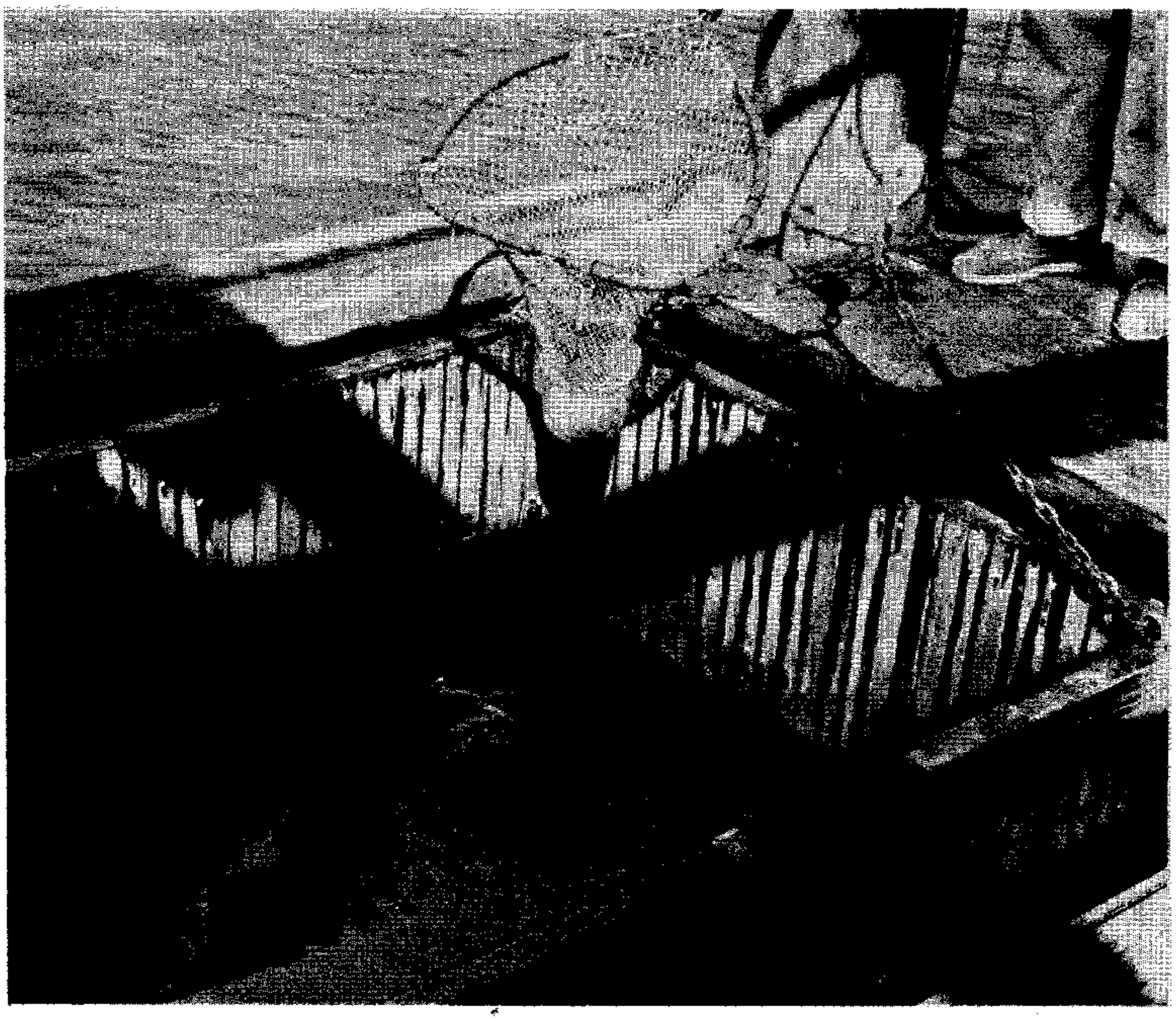
Trade practices

In Galveston Bay, trade practices are complex. If a dealer owns and operates the fishing boat, he retains the full retail value of the shrimp. If a dealer owns the boat, but hires a boat operator, he pays the operator one-third the retail value of the shrimp. When the dealer buys shrimp from an independent boat-owner, he pays the owner one-half the retail value of the shrimp. In the last instance, if the actual fishing was done



by a hired operator, he in turn receives one-fourth the retail value from the boat-owner. Further complications arise from the common practice of dealers accepting a catch on consignment. Under this arrangement, any loss due to mortality is sustained by the boat-owner.

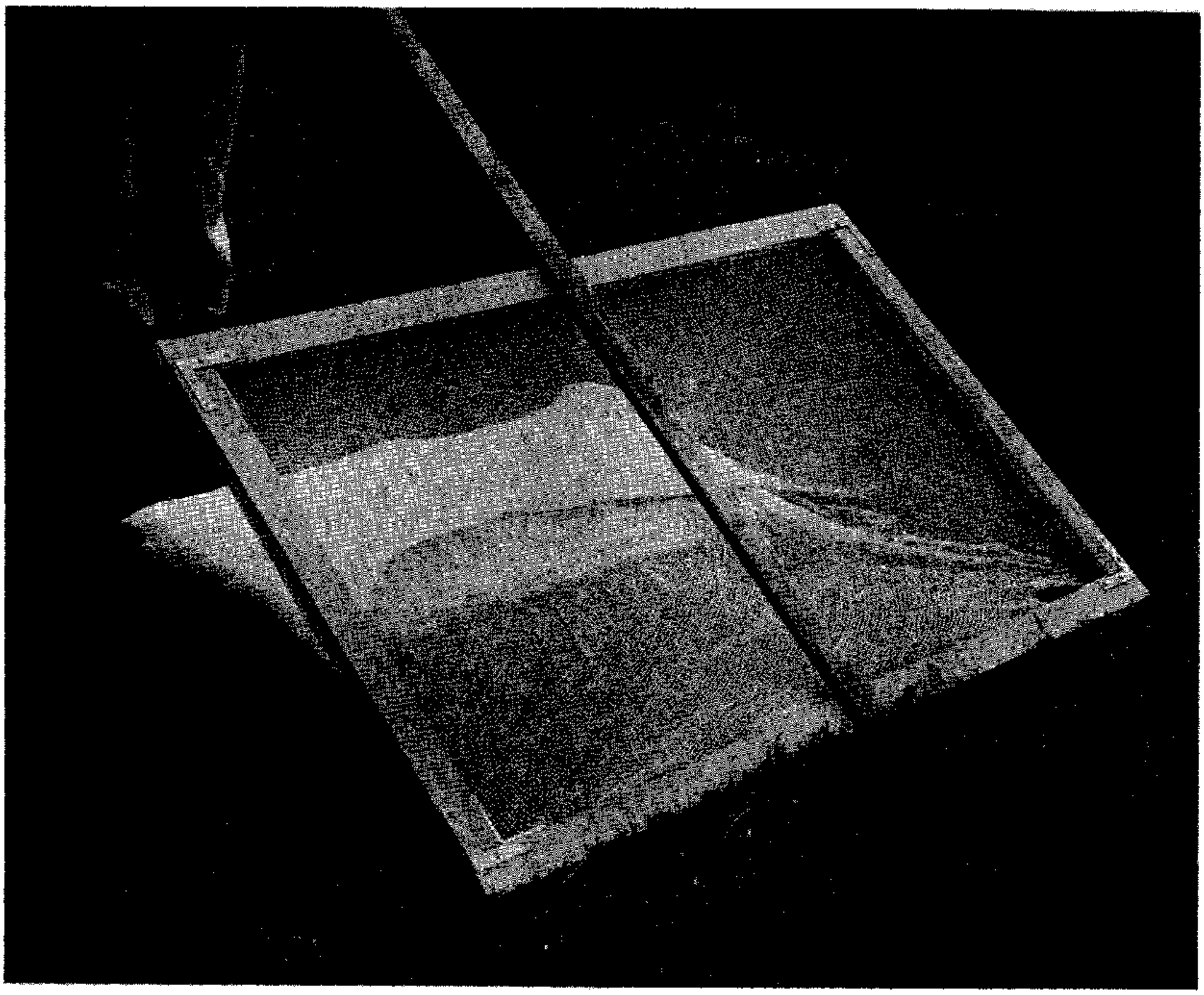
Live shrimp are retailed by number or by the quart. When sold by the quart, shrimp are measured by means of a perforated, plastic container sewn into the bottom of a dip-net. During the summer when shrimp are plentiful, the retail price of live shrimp averages $2.00 per quart or 2¢ per shrimp in the upper Texas coast and $3.00 per quart or 3¢ per shrimp in the Port Isabel area. During the winter when shrimp are scarce, the price in the upper coastal areas rises to $3.00 per quart and in the Port Isabel area as high as $5.00 per quart. Dead bait is sold by the pound at 50 to 75 cents per pound throughout the year. One quart of live shrimp is approximately equivalent to 1 1/2 pounds of heads-on shrimp or 100 shrimp.



Fishing gear and methods of operation

In Florida a variety of fishing gear is used. On the northeast coast, bait shrimp are caught mainly with pushnets. In the Biscayne Bay area, otter trawls and frame trawls are used extensively. In the Florida Bay area, both frame and otter trawls are common, but most of the catch is obtained with bridge and channel lift nets. On the west coast, the center of the Florida bait shrimp industry, side-frame trawls are utilized by most fishermen. Throughout the state, dipnets and cast nets are used by part-time bait fishermen. Stopnets, now illegal in Florida, were popular in the Indian River area during World War II.

The pushnet consists of netting attached to a rectangular frame, 3 to 10 feet long by 2 to 4 feet wide, with a 6- to 8-foot handle attached. across the midpoints of the long sides. The handle has a cross piece at the end. The net is fished in 3 feet of water or less, and is pushed by



the operator for periods from 10 to 30 minutes. The catch is emptied into a skiff towed behind the operator and is sorted either by himself or by a partner in the skiff.

Bridge nets are attached to rectangular galvanized pipe frames, measuring 2 feet by 6 feet. Nets up to 10 feet in length are common and mesh sizes vary from 1/2 to 3/4 inch stretched measure. The net is fished from a bridge on the outflowing tide and is held in position by the current. The gear is fastened by means of a long line to the bridge railing.

Channel nets are similar to bridge nets except that the frames and nets are larger and the gear is operated from vessels anchored in channels where strong tidal currents are found. Nets up to 20 feet in length are attached to frames measuring approximately 4 feet by 18 feet. The frame is held alongside the vessel and guyed to the mast and bow to hold the net in fishing position. The catch is removed by lifting the gear or by pulling the bag aboard. Two nets can be operated simultaneously from one vessel.

The small otter trawls, used in some areas of northeast Florida, are similar to those used in the Texas bait fishery. Major differences between the Florida and Texas trawls are the sizes of thread used and possibly mesh sizes. This gear is not considered satisfactory by Florida bait fishermen for capturing live shrimp, and is used mostly for obtaining shrimp for food or dead bait. On the west coast of Florida, the otter trawl has been replaced to a large extent by the side-frame trawl.

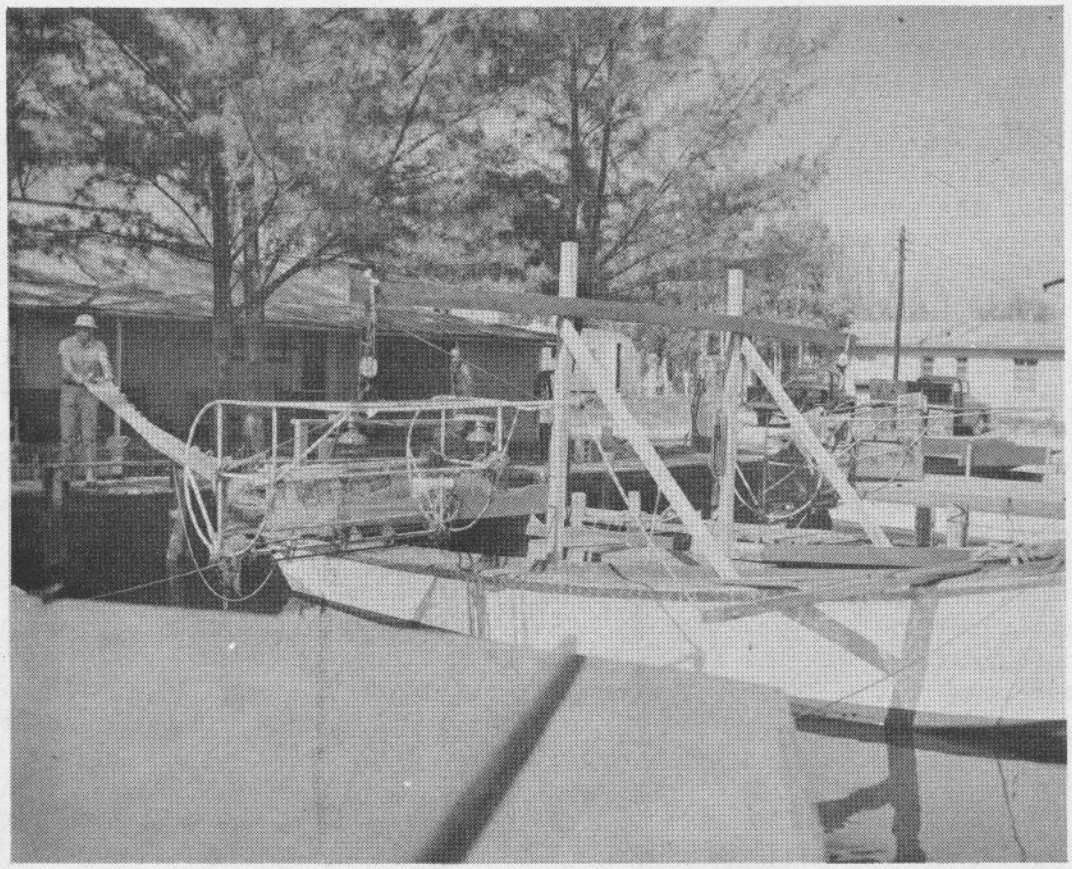
The side-frame trawl consists of a net attached to the lower part of a galvanized pipe framework. The mouth of the net is usually 2 1/2 feet by 6 feet, but larger sizes are used. The net is made of No. 6 or No. 9 cotton twine and ranges in length from 9 to 18 feet. Mesh sizes vary from 3/4 to 1 inch stretched measure. A roller of metal or wooden slats is attached to the bottom of the frame for operation over grass beds. Excessive amounts of seaweed and trash are prevented from entering the net by iron rods fixed vertically at the mouth of the frame. The frame trawl is raised and lowered by block and tackle attached to a cross-beam. Most boats are rigged with two nets which are fished and hauled simultaneously if equipped with power winches, or alternately when the gear is handled manually. Normal operations require a crew of two men.

Because of the nocturnal habit of the brown and pink shrimp, which form the basis of the fishery, side-frame trawling is done at night. Each haul lasts from 10 to 15 minutes. When the trawl is lifted, the shrimp are sorted and placed in bait wells on the boat. Other invertebrates, trash, and fish are returned to the water.

Transporting and holding methods

In Florida, centers of bait production are often far removed from centers of demand and transportation of shrimp in tank trucks is more extensive than in Texas. The trucking units are similar to those used in Texas, but generally have a larger carrying capacity.

Holding pens are also similar to those used in Texas. However, the type that is suspended in water is usually covered with plastic or wire screen instead of cypress slats or perforated fiberboard commonly used in Texas. In some areas bait wells built into floating docks are popular.



Trade practices

The price structure in the Florida bait fishery is more complex than that in the Texas fishery. Depending on the locality and the supply, the retail price of bait shrimp fluctuates between 35 and 75 cents per dozen. As in the Texas area, some retail dealers own and operate their own fishing vessels and retain the full retail value of the shrimp. Retail dealers located near centers of shrimp production can buy directly from wholesale dealers at $12 per thousand. Truckers also obtain shrimp from wholesale dealers at $12 per thousand for transporting and selling to retail dealers in areas where the supply is insufficient to meet the demand. Truckers receive from $15 to $20 per thousand depending on the distances involved. Most wholesale dealers obtain shrimp from independent boats at a cost of $10 per thousand. If a boat operator is hired, he is paid $6 per thousand shrimp by the boat owner.

SUGGESTIONS FOR HOLDING LIVE BAIT SHRIMP

Since individual shrimp are held in captivity for a short time, their survival and well-being depends on relatively few factors. Overstocking the pens, disposal of waste products, and oxygen content of the water appear to be of major importance.

Overstocking is undesirable for several reasons. With increasing numbers of shrimp in a tank, there is an increase in waste products and a greater oxygen demand. If excess waste products are not disposed of by increasing the water circulation or by filtration, they can reach deadly levels. Greater oxygen demand should be met by increasing the water circulation or by aerating the water. Even if water flow and aeration are not problems, overstocking can result in considerable loss; shrimp are cannibalistic and are more prone to attack one another when crowded.

In stocking holding pens, rates of 3 shrimp per cubic foot, if the water is not circulated, and 10 shrimp, if the water is circulated, have been suggested. A water flow of 8 to 15 gallons per second has also been recommended. These figures will vary somewhat in different situations and are best determined by the individual dealer through experience and observation.

Salinity and temperature of the water in holding pens are factors of lesser importance, but drastic changes should be avoided. Running sea water should be pumped from a deep source to keep salinity and temperature changes to a minimum. In areas of strong sunlight, shading of holding tanks is strongly recommended to keep the water cool and retard formation of plant growths on the sides of the tank.

Since bait shrimp are not normally held for long periods, feeding is not essential and is even undesirable. At warm temperatures, uneaten food spoils rapidly and fouls the water. There are usually sufficient dead shrimp in the pens to supply food for the survivors. If uneaten after a short time, dead shrimp should be removed from the pens to prevent fouling. Bait pens suspended in water should be constructed with double bottoms and sides to prevent fish from eating the legs of shrimp.

The use of polyethylene or similar plastic piping is recommended for several reasons. Many plastics are relatively inexpensive and will not rust. They are inert and will not add any metal which is harmful to marine animals. If steel piping is used, a piece of zinc should be placed inside the pipes to reduce corrosion.

April 1959.

APPENDIX I

Scientific names of species mentioned in text.

Crustaceans

White shrimp	Penaeus setiferus
Brown shrimp	Penaeus aztecus
Pink shrimp	Penaeus duorarum
Sea bob	Xiphopeneus krøyeri
Broken-neck shrimp	Trachypeneus constrictus Trachypeneus similis
River shrimps	Macrobrachium ohionis Macrobrachium acanthurus Macrobrachium jamaicense
Grass shrimps	Palaemonetes spp.
Blue crab	Callinectes sapidus

Fishes

Speckled sea trout	Cynoscion nebulosus
Silver sea trout	Cynoscion nothus
Sand sea trout	Cynoscion arenarius
Redfish (Red Drum)	Sciaenops ocellata
Southern flounder	Paralichthys lethostigma
Gulf flounder	Paralichthys albiguttus
Ocellated fluke	Ancylopsetta quadrocellata

APPENDIX II

The following publications contain more detailed information on the biology of shrimp and the bait shrimp industry.

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1956 Growth, migration, spawning and size distribution of shrimp, Penaeus setiferus. U. S. Dept. of the Interior, Fish and Wildlife Service., Fish. Bull., 56 (106):553-645.

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